APPENDIX A:

CONSULTATIONS AND BIOLOGICAL ASSESSMENT

Department of Energy

Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831—

May 29, 2001

Mr. Keith Wethington
Kentucky Department of Fish
and Wildlife Resources
#1 Game Farm Road
Frankfort, Kentucky 40601

Dear Mr. Wethington:

CONSULTATION CONCERNING STATE-LISTED SPECIES FOR THE PROPOSED IMPLEMENTATION OF THE AUTHORIZED LIMITS PROCESS AT THE C-746-U LANDFILL, PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY

The Department of Energy (DOE) proposes to implement the authorized limits process for determining the acceptability of waste containing low levels of residual radioactive materials on both a surface-contaminated and a volumetric basis in accordance with established DOE requirements for disposal at the C-746-U Landfill. Authorized limits are described in DOE Order 5400.5 Chapter IV, *Residual Radioactive Materials*, and are limits approved by DOE to permit the release of property from DOE control, consistent with radiation protection standards for general employees, members of the public, and the environment. Authorized limits determinations would be made in accordance with DOE Order 5400.5 and its associated guidance and would be both waste stream-specific and facility-specific. Waste streams containing residual radioactive materials below approved authorized limits would not require radiological control under the *Atomic Energy Act* (AEA) and would not be considered radioactive waste.

The C-746-U Landfill is an existing, sanitary/industrial landfill that was constructed from 1995 to 1997 by DOE for disposal of solid wastes that are not regulated as hazardous waste under *Resource Conservation and Recovery Act* (RCRA) Subtitle C or as waste containing polychlorinated biphyenyls (PCBs) under the *Toxic Substances Control Act* (TSCA). The C-746-U Landfill is located north of DOE Paducah's main plant area and is permitted by the Commonwealth of Kentucky in accordance with the requirements of Kentucky solid waste regulations [401 Kentucky Administrative Regulations (KAR) 48, *Standards for Solid Waste Facilities*] and Subtitle D of RCRA. Waste streams that may be acceptable for disposal at the C-746-U Landfill are generated from activities at the Paducah Site and include soils, wood, concrete, roofing and construction debris, and other nonhazardous sanitary and industrial wastes [e.g., paper, fly ash, treated medical waste, asbestos, cardboard, tires, animal carcasses, detectable PCB (less than 50 ppm) waste, personal protective equipment, plastic, alkaline batteries, and metals]. The proposed action would not affect designation of the landfill as a

sanitary/industrial landfill that does not accept RCRA-hazardous, TSCA-regulated, or radioactive waste.

The proposed action would not entail alteration or loss of habitat because is would take place at an existing landfill. Landfill procedures for vector and erosion control require daily placement of cover on the working face and maintenance of a vegetative cover over clean cover over the remainder of the landfill site. Waste streams placed in the landfill have low levels of organic content, and standard dust control practices are routinely followed. Thus, opportunities for local biota to come into contact with the waste, either directly or indirectly, are minimal.

This letter is intended to serve as a request for an updated list of state-protected species that may occur on or in the vicinity of the proposed action and to solicit your recommendations and comments about the potential effects of this action. Your input will be used in the preparation of an Environmental Assessment of the proposed action. A prompt reply would be appreciated.

If you need any further information on this request, please do not hesitate to call me at (865) 576-0938.

Sincerely,

James L. Elmore, Ph. D.
Alternate NEPA Compliance Officer

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF FISH AND WILDLIFE RESOURCES
C. THOMAS BENNETT, COMMISSIONER

June 12, 2001

James L. Elmore, Ph.D.
Alternate NEPA Compliance Officer
U.S. Department of Energy
Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, TN 37381

Re: Consultation concerning state-listed species for the proposed implementation of the authorized limits process at the C-746-U Landfill, Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Dear Mr. Elmore:

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has received your above-referenced request for information. Accordingly, KDFWR provides the following comments.

A search of the Kentucky Fish and Wildlife Information System (KFWIS) indicates that the following state-listed threatened and/or endangered species (some are also federally listed) are potentially found in close proximity to the referenced project.

Common Name	Scientific Name
alligator gar	*Atractosteus spatula*
Alabama shad	*Alosa alabamae*
cypress minnow	*Hybognatus hayi*
taillight shiner	*Notropis maculatus*
spotted sunfish	*Lepomis punctatus*
Johnny darter	*Etheostoma nigrum susanae*
yellow-crowned night-heron	*Nyctanassa violaceus*
blue-winged teal	*Anas discors*
hooded merganser	*Lophodytes cucullatus*
Indiana bat	*Myotis sodalis*
ring pink	*Obovaria retusa*

If the proposed action stays within the current boundaries of the C-746-U landfill (i.e., will not involve utilization of adjacent land that is currently part of West Kentucky Wildlife Management Area), KDFWR does not anticipate any negative impacts to the above-listed species.

KDFWR appreciates the opportunity to comment. If you have any questions or comments, please contact me at 502/564-7109, ext. 366 or via e-mail at jim.lane@mail.state.ky.us.

Sincerely,

James S. Lane, Jr.
Wildlife Biologist III

cc: Environmental Section File

Department of Energy

Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831—

May 29, 2001

Ms. Sara Hines
Data Manager
Kentucky State Nature Preserves Commission
801 Schenkel Lane
Frankfort, Kentucky 40601

Dear Ms. Hines:

CONSULTATION CONCERNING STATE-LISTED SPECIES FOR THE PROPOSED IMPLEMENTATION OF THE AUTHORIZED LIMITS PROCESS AT THE C-746-U LANDFILL, PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY

The Department of Energy (DOE) proposes to implement the authorized limits process for determining the acceptability of waste containing low levels of residual radioactive materials on both a surface-contaminated and a volumetric basis in accordance with established DOE requirements for disposal at the C-746-U Landfill. Authorized limits are described in DOE Order 5400.5 Chapter IV, *Residual Radioactive Materials*, and are limits approved by DOE to permit the release of property from DOE control, consistent with radiation protection standards for general employees, members of the public, and the environment. Authorized limits determinations would be made in accordance with DOE Order 5400.5 and its associated guidance and would be both waste stream-specific and facility-specific. Waste streams containing residual radioactive materials below approved authorized limits would not require radiological control under the *Atomic Energy Act* (AEA) and would not be considered radioactive waste.

The C-746-U Landfill is an existing, sanitary/industrial landfill that was constructed from 1995 to 1997 by DOE for disposal of solid wastes that are not regulated as hazardous waste under *Resource Conservation and Recovery Act* (RCRA) Subtitle C or as waste containing polychlorinated biphyenyls (PCBs) under the *Toxic Substances Control Act* (TSCA). The C-746-U Landfill is located north of DOE Paducah's main plant area and is permitted by the Commonwealth of Kentucky in accordance with the requirements of Kentucky solid waste regulations [401 Kentucky Administrative Regulations (KAR) 48, *Standards for Solid Waste Facilities*] and Subtitle D of RCRA. Waste streams that may be acceptable for disposal at the C-746-U Landfill are generated from activities at the Paducah Site and include soils, wood, concrete, roofing and construction debris, and other nonhazardous sanitary and industrial wastes [e.g., paper, fly ash, treated medical waste, asbestos, cardboard, tires, animal carcasses, detectable PCB (less than 50 ppm) waste, personal protective equipment, plastic, alkaline batteries, and metals]. The proposed action would not affect designation of the landfill as a sanitary/industrial landfill that does not accept RCRA-hazardous, TSCA-regulated, or radioactive waste.

The proposed action would not entail alteration or loss of habitat because is would take place at an existing landfill. Landfill procedures for vector and erosion control require daily placement of cover on the working face and maintenance of a vegetative cover over clean cover over the remainder of the landfill site. Waste streams placed in the landfill have low levels of organic content, and standard dust control practices are routinely followed. Thus, opportunities for local biota to come into contact with the waste, either directly or indirectly, are minimal.

This letter is intended to serve as a request for an updated list of state-protected species that may occur on or in the vicinity of the proposed action and to solicit your recommendations and comments about the potential effects of this action. Your input will be used in the preparation of an Environmental Assessment of the proposed action. A prompt reply would be appreciated.

If you need any further information on this request, please do not hesitate to call me at (865) 576-0938.

Sincerely,

James L. Elmore, Ph. D.
Alternate NEPA Compliance Officer

Department of Energy

Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831—

May 29, 2001

Dr. Lee Barclay
Field Supervisor
Fish and Wildlife Service
U.S. Department of the Interior
446 Neal Street
Cookeville, Tennessee 38501

Dear Dr. Barclay:

INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT FOR THE PROPOSED IMPLEMENTATION OF THE AUTHORIZED LIMITS PROCESS AT THE C-746-U LANDFILL, PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY

The Department of Energy (DOE) proposes to implement the authorized limits process for determining the acceptability of waste containing low levels of residual radioactive materials on both a surface-contaminated and a volumetric basis in accordance with established DOE requirements for disposal at the C-746-U Landfill. Authorized limits are described in DOE Order 5400.5 Chapter IV, *Residual Radioactive Materials*, and are limits approved by DOE to permit the release of property from DOE control, consistent with radiation protection standards for general employees, members of the public, and the environment. Authorized limits determinations would be made in accordance with DOE Order 5400.5 and its associated guidance and would be both waste stream-specific and facility-specific. Waste streams containing residual radioactive materials below approved authorized limits would not require radiological control under the *Atomic Energy Act* (AEA) and would not be considered radioactive waste.

The C-746-U Landfill is an existing, sanitary/industrial landfill that was constructed from 1995 to 1997 by DOE for disposal of solid wastes that are not regulated as hazardous waste under *Resource Conservation and Recovery Act* (RCRA) Subtitle C or as waste containing polychlorinated biphyenyls (PCBs) under the *Toxic Substances Control Act* (TSCA). The C-746-U Landfill is located north of DOE Paducah's main plant area and is permitted by the Commonwealth of Kentucky in accordance with the requirements of Kentucky solid waste regulations [401 Kentucky Administrative Regulations (KAR) 48, *Standards for Solid Waste Facilities*] and Subtitle D of RCRA. Waste streams that may be acceptable for disposal at the C-746-U Landfill are generated from activities at the Paducah Site and include soils, wood, concrete, roofing and construction debris, and other nonhazardous sanitary and industrial wastes [e.g., paper, fly ash, treated medical waste, asbestos, cardboard, tires, animal carcasses, detectable PCB (less than 50 ppm) waste, personal protective equipment, plastic, alkaline

batteries, and metals]. The proposed action would not affect designation of the landfill as a sanitary/industrial landfill that does not accept RCRA-hazardous, TSCA-regulated, or radioactive waste.

The proposed action would not entail alteration or loss of habitat because it would take place at an existing landfill. Landfill procedures for vector and erosion control require daily placement of cover on the working face and maintenance of a vegetative cover over clean cover over the remainder of the landfill site. Waste streams placed in the landfill have low levels of organic content, and standard dust control practices are routinely followed. Thus, opportunities for local biota to come into contact with the waste, either directly or indirectly, are minimal.

This letter serves as informal consultation under Section 7 of the Endangered Species Act. In this regard, DOE requests an updated list of protected species that might be at, or near, the site of the proposed action and solicits your recommendations and comments about the potential effects of this action. Your input will be used in the preparation of an Environmental Assessment of the proposed action.

If you need any further information on this request, please do not hesitate to call me at (865) 576-0938.

Sincerely,

James L. Elmore, Ph. D.
Alternate NEPA Compliance Officer

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

June 13, 2001

Mr. James L. Elmore, Ph.D.
U.S. Department of Energy
Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831

Dear Dr. Elmore:

Thank you for your letter of May 29, 2001, regarding the preparation of an Environmental Assessment (EA) for the implementation of the authorized limits process at the C-746-U Landfill at the Paducah Gaseous Diffusion Plant in McCracken County, Kentucky. U.S. Fish and Wildlife Service (Service) personnel have reviewed the information submitted and offer the following comments for consideration.

According to our records, the Federally endangered Indiana bat (*Myotis sodalis*) may occur near the C-746-U landfill. Qualified biologists should assess potential impacts and determine if the proposed project may affect the species. Please submit a copy of your assessment and finding to this office for review and concurrence. A finding of "may affect" could require the initiation of formal consultation procedures.

These constitute the comments of the U.S. Department of the Interior in accordance with provisions of the Endangered Species Act (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.). We appreciate the opportunity to comment. Should you have any questions or need further assistance, please contact Steve Alexander of my staff at 931/528-6481, ext. 210, or via e-mail at *steven_alexander@fws.gov*.

Sincerely,

Lee A. Barclay, Ph.D.
Field Supervisor

xc: Laila Lienesch, FWS, Frankfort

Department of Energy

Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831—

July 19, 2001

Dr. Lee A. Barclay, Ph.D.
Field Supervisor
Fish and Wildlife Service
446 Neal Street
Cookeville, Tennessee 38501

Dear Dr. Barclay:

ADDITIONAL INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT FOR THE PROPOSED IMPLEMENTATION OF AUTHORIZED LIMITS PROCESS AT THE C-746-U LANDFILL IN PADUCAH, KENTUCKY

Thank you for your prompt reply to my letter of May 29, 2001, concerning the implementation of the authorized limits process for waste acceptance at the C-746-U Landfill, Paducah Gaseous Diffusion Plant (PGDP), Paducah, Kentucky. As you requested, the Department of Energy (DOE) has prepared a Biological Assessment (BA) for the federally listed species, *Myotis sodalis*, identified in your June 13, 2001 letter.

The enclosed BA is submitted for your review and concurrence. Based on the BA, DOE has determined that the proposed implementation of the authorized limits process at the C-746-U Landfill at the PGDP is not likely to adversely affect the listed species. Results of the BA will be summarized in the text of the Environmental Assessment (EA) for the project, and the BA will be appended to the EA.

Following your review of the BA, please check the appropriate concurrence block and sign below. Please fax your comments to me at (865) 576-0746 as soon as possible, so that we may expeditiously complete the EA. If you need further information or wish to discuss the BA, please call me at (865) 576-0938. Thank you in advance for your prompt reply.

Sincerely,

James L. Elmore, Ph.D.
Alternate NEPA Compliance Officer

Enclosure

cc:
David Tidwell, EM-34
Harvey Rice, EM-34

Subject: **ADDITIONAL INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT FOR THE PROPOSED IMPLEMENTATION OF AUTHORIZED LIMITS PROCESS AT THE C-746-U LANDFILL IN PADUCAH, KENTUCKY**

☐ This Biological Assessment supports the conclusion that the implementation of the authorized limits process at the C-746-U Landfill, Paducah Gaseous Diffusion Plant, would not adversely impact federally listed protected species and/or habitat. With this BA, DOE has satisfied consultation requirements of Section 7 of the Endangered Species Act.

☐ This Biological Assessment does not support the conclusion that the implementation of the authorized limits process at the C-746-U Landfill, Paducah Gaseous Diffusion Plant, would not adversely impact federally listed protected species and/or habitat. DOE has not satisfied consultation requirements of Section 7 of the Endangered Species Act.

Signature Date

Endangered Species Act

BIOLOGICAL ASSESSMENT

Paducah C-746-U Landfill

Implementation of the Authorized Limits Process

Paducah Gaseous Diffusion Plant

McCracken County, Kentucky

Prepared by

Anne Dickie, M.S.

Senior Scientist, Tetra Tech, Inc.

June 2001

U. S. Department of Energy

Oak Ridge Operations Office

Oak Ridge, TN

June 2001

BIOLOGICAL ASSESSMENT FOR THREATENED AND ENDANGERED SPECIES UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT FOR AN EXISTING SOLID WASTE LANDFILL

SUMMARY

This biological assessment (BA) evaluates potential impacts on federally listed plant and animal species that could result from the implementation of the authorized limits process at the C-746-U Landfill at the Paducah Gaseous Diffusion Plant (PGDP) in McCracken County, Kentucky. The species considered in this BA is the endangered Indiana bat as identified in a letter from the U.S. Fish and Wildlife Service (FWS) to the U.S. Department of Energy (DOE), dated June 13, 2001 (FWS 2001).

DOE concludes, for the reasons described in the main text of this BA, that the project is not likely to adversely affect this species. Also, since no proposed or designated critical habitats are present on, or near, the locations where activities would occur, none would be affected.

INTRODUCTION AND PROJECT DESCRIPTION

The C-746-U Landfill is an existing, sanitary/industrial landfill that was constructed from 1995 to 1997 by DOE for disposal of solid wastes that are not regulated as hazardous waste under *Resource Conservation and Recovery Act* (RCRA) Subtitle C or as waste containing polychlorinated biphyenyls (PCBs) under the *Toxic Substances Control Act* (TSCA). The C-746-U Landfill is located north of DOE Paducah's main plant area and is permitted by the Commonwealth of Kentucky in accordance with the requirements of Kentucky solid waste regulations [401 Kentucky Administrative Regulations (KAR) 48, *Standards for Solid Waste Facilities*] and Subtitle D of RCRA. The landfill is lined, has a leachate collection system, and will have a multi-layer cap when closed.

Waste streams that may be acceptable for disposal at the C-746-U Landfill are generated from activities at the Paducah Site and include soils, wood, concrete, roofing and construction debris, and other nonhazardous sanitary and industrial wastes [e.g., paper, fly ash, treated medical waste, asbestos, cardboard, tires, animal carcasses, detectable PCB (less than 50 ppm) waste, personal protective equipment, plastic, alkaline batteries, and metals]. The proposed action would not affect designation of the landfill as a sanitary/industrial landfill that does not accept RCRA-hazardous, TSCA-regulated, or radioactive waste.

Operation of the C-746-U facility is regulated by DOE under the authority of the Atomic Energy Act (AEA) and the Commonwealth of Kentucky under authority delegated by the U.S. Environmental Protection Agency (EPA) to enforce implementing regulations for RCRA through provisions in regulations for solid waste landfills by the Commonwealth of Kentucky (401 KAR 48). Under the AEA, DOE has the responsibility and authority to establish radiological limits for protection of the public and the environment, either in the form of release criteria for off-site disposition of waste it generates or for waste acceptance criteria for disposal of materials in a DOE-owned on-site landfill.

The following brief description is extracted from the draft Environmental Assessment (EA) for the project (DOE 2001). Of the two alternatives considered in the EA, one is No Action, and the second is implementation of the authorized limits process at the existing landfill. Alternative 1 - No Action would not affect wildlife, including listed species; thus, it is not considered further. The remaining alternative is briefly described below.

Alternative 2 in the EA (DOE 2001) is to implement the authorized limits process for determining the acceptability of solid waste containing low levels of residual radioactive materials on both a surface-contaminated and a volumetric basis in accordance with established DOE requirements for disposal at the C-746-U Landfill. Authorized limits are described in DOE Order 5400.5 Chapter IV, *Residual Radioactive Materials*, and are limits approved by DOE to permit the release of property from DOE radiological control, consistent with radiation protection standards for general employees, members of the public, and the environment. Authorized limits determinations would be evaluated in accordance with DOE Order 5400.5 and its associated guidance and would be both waste stream-specific and facility-specific.

Under Alternative 2, the Preferred Alternative, DOE would implement the authorized limits process per DOE Order 5400.5 to determine the acceptability of waste streams containing small amounts of residual radioactive materials in mass or volume for disposal at the C-746-U Landfill on a waste stream-specific basis. These authorized limits would differ from the operating limits or waste acceptance criteria historically used at this landfill as these limits would be developed on a waste stream-specific basis and formally approved in accordance with the requirements of DOE Order 5400.5 (or successor documents) and associated guidance. Waste streams containing residual amounts of surface radioactivity would be accepted for disposal if below the generic authorized limits enumerated in DOE Order 5400.5 (Table IV-1); however, any other authorized limits for surface radioactivity would have to be formally evaluated and approved by DOE on a waste stream-specific basis in accordance with DOE Order 5400.5 requirements. The Waste Acceptance Criteria (WAC) for the landfill would be revised to specify that the authorized limits process must be used where appropriate to determine and document the acceptability of waste for disposal. As before, RCRA-hazardous, TSCA-regulated, and radioactive waste would not be accepted.

DOE Order 5400.5 and its associated guidance allow for local approval of authorized limits which would result in an effective dose equivalent (EDE) to humans of 1 mrem/year or less. Authorized limits resulting in an annual EDE between 1 mrem and 25 mrem require additional approval by DOE Headquarters. The cognizant DOE field office has chosen to use a 1 mrem/year dose level in developing authorized limits for any wastes to be disposed at the C-746-U Landfill. Approval of authorized limits for waste streams to be disposed of at the C-746-U Landfill would be based on a dose assessment to demonstrate that the levels of residual radioactive materials in a given waste stream would satisfy criteria specified in DOE Order 5400.5 and associated guidance as well as to satisfy the DOE-ORO dose level of 1 mrem/yr EDE to the public for the C-746-U Landfill.

The dose assessment would evaluate the potential dose to both workers and the public under current and potential future scenarios. Each analysis would be modeled for specific waste streams at the landfill

using conservative assumptions to estimate the potential doses. Only those waste streams estimated to result in doses of 1 mrem/yr EDE or less would be eligible for disposal at the landfill. Waste streams containing residual radioactive materials below approved authorized limits do not require radiological control under the *Atomic Energy Act* (AEA) and are not be considered radioactive waste.

Specific exposure limits for biota would not be designated as part of the proposed action because no such limits have been formally established by DOE or by other regulatory agencies, and potential pathways for exposure as a result of this action are very limited. The proposed action would not entail alteration or loss of habitat because is would take place at an existing landfill. Landfill procedures for vector and erosion control require daily placement of cover on the working face and maintenance of a vegetative cover over clean cover over the remainder of the landfill site. Waste streams placed in the landfill have low levels of organic content, and standard dust control practices are routinely followed. Thus, opportunities for local biota to come into contact with the waste, either directly or indirectly, are minimal. This is discussed in greater detail in the impacts section of this BA.

ECOLOGICAL DESCRIPTION OF THE SITES

The following brief description is taken from DOE (2001), verified with field reconnaissance by the author (A. Dickie, Tetra Tech, Inc., personal observations, August, 2001). The C-746-U Landfill occurs within existing industrialized areas of the Paducah Gaseous Diffusion Plant and is near the West Kentucky Wildlife Management Area (WKWMA) on the landfill site's western side. The landfill site has been cleared and, where vegetative cover is present, is maintained by mowing. Two intermittent tributaries of Little Bayou Creek, an intermittent stream, flow approximately 100 ft and 50 ft from the eastern and northwestern boundaries of the landfill site respectively. Trees, when present in close proximity to the landfill site, mainly along the two tributaries, are generally less than 20 cm diameter at breast height (dbh) and do not have loose bark as required by roosting Indiana bats.

Vegetation on the landfill site, is limited to grasses and other herbaceous ground cover. The nearby tributaries are partially bordered by a thin riparian zone of plants. The nearby WKWMA consists primarily of stands of bottomland hardwoods interspersed with upland hardwoods and old fields. Potential summer roosting and foraging habitats for the Indiana bat are present in the WKWMA, although most trees are less than 20 cm diameter (see reported sighting below). The Bayou Creek (formerly known as Big Bayou Creek) is the nearest blue-line stream in the area; the nearest of its tributaries to the landfill are on the western side of the WKWMA.

STATUS AND BIOLOGY OF THE LISTED SPECIES

The U. S. Fish & Wildlife Service has identified the Indiana bat (*Myotis sodalis*) as a federally-endangered species that could potentially occur near the landfill site (FWS 2001). The Indiana bat is also a listed species by the Commonwealth of Kentucky. There has been one reported occurrence of the Indiana bat in McCracken County (Kentucky State Nature Preserves Commission 2000), but no reported occurrences at the PGDP site (DOE 2000). The reported occurrence in McCracken County, a result of

mist netting, was made in June 1991 and was on WKWMA land in the Joppa Quadrangle near the Shawnee Steam Plant and to the north (upstream) of the landfill site (Hines 2001). There have been no other reports of the Indiana bat within an 8 km (5 mi) radius of the PGDP (Hines 2001). The general ecology of the Indiana bat is summarized below. Unless otherwise noted, or referenced, general biological information on the species is derived from Harvey (1992) and Webb (2000).

Indiana bat (*Myotis sodalis*)

The range of the endangered Indiana bat is the eastern U.S. from Oklahoma, Iowa, and Wisconsin east to Vermont and south to northwestern Florida. Distribution is associated with major cave regions and areas north of cave regions. The present total population is estimated at ca. 352,000 with more than 85% hibernating at only nine location - two caves and a mine in Missouri, three caves in Indiana, and three caves in Kentucky.

Indiana bats hibernate in limestone caves from October to April, depending upon climatic conditions. Indiana bats usually hibernate in large, dense clusters of up to several thousand individuals in sections of the hibernation cave where temperatures average 38 - 43 F and with relative humidities of 66 to 95 percent. Bat clusters may contain 300 - 384 bats per square foot. The bats leave the caves and migrate to summer roosts mid-spring.

Summer roosting-habitat criteria for Indiana bats are frequently revised as more is discovered about this species' habits. The most recent information applicable for the region is available from the FWS Cookeville Office ("Components of Suitable Habitat for the Endangered Indiana Bat"). In general, Indiana bats establish summer maternity and sometimes male night roosts or bachelor colonies under the loose bark of large, usually hardwood trees (> 20 cm diameter). Indiana bats have been observed to return to the same roosting and foraging habitat year-after-year. Indiana bats are nocturnal, foraging at night and feeding on insects.

Female Indiana bats depart the caves before the males and arrive at summer maternity roosts in mid-May. A single off-spring, born in June, is raised by the mother under loose tree bark, primarily in wooded streamside habitat. Mothers and babies reside in maternity colonies that use multiple, primary roost trees throughout most of the summer. Secondary roosts are used intermittently by some of the bats, particularly during periods of extreme precipitation or extreme temperatures. Thus, there may be more than a dozen roosts used by some Indiana bat colonies (FWS 1999a). Kurta et al. (1996) found that female Indiana bats may change roosts about every three days, and a group of these bats may use more than 17 different trees in a single maternity season. They depart the summer roosts for hibernation caves in September. The summer roost of the adult males is often near the maternity roost, although a few males do stay in caves over the summer.

The first maternity colony was discovered in 1974 under the loose bark on a dead butternut hickory tree in east-central Indiana. The colony numbered about 50 individuals and also used an alternate roost under the bark of a living shagbark hickory tree. The total foraging range of the colony consisted of a linear strip along approximately 0.5 mi. of creek. Foraging habitat was confined to air space from 6 ft to ca. 95 ft high near the foliage of streamside and floodplain trees. Two additional colonies were discovered

during subsequent summers, also in east-central Indiana. These had estimated populations of 100 and 91 individuals, including females and pups. Habitat and foraging area were similar to the first colony discovered. Evidence gathered during recent years indicates that, during summer, Indiana bats are widely dispersed in suitable habitat throughout large portion of their range. Additional maternity colonies have been discovered using radiotelemetry techniques in more recent years. Data thus far reinforces the belief that floodplain forest is important habitat for Indiana bat summer populations. However, colonies have been located in upland and in coniferous habitats as well.

The bats arrive near their hibernation caves between August and September and begin swarming and mating activities. Swarming at the cave entrances continues into mid- or late October. The bats continue feeding during this time building a store of fat reserves for hibernation. It is thought that Indiana bats feed primarily on moths. Open riparian corridors along streams are required for foraging habitat. A longevity record of 13 years and 10 months has been recorded for the Indiana bat. Hibernating bats leave little evidence of their past numbers, thus, it is difficult to calculate a realistic estimate of the population decline for this species. However, population estimates at major hibernacula indicated a 34% decline in the total Indiana bat population from 1983 to 1989.

Although the C-746-U Landfill site has no hibernating, roosting, or foraging habitat as described above, the creeks within an expanded area around the landfill site do provide Indiana bat summer roosting and foraging habitat. No maternity roosts have been located on the WKWMA and the only record of Indiana bats in the area is from a single specimen from the 1991 survey (Kentucky State Nature Preserves Commission 2000).

POTENTIAL IMPACTS OF THE PROJECT

The proposed action would not entail alteration or loss of habitat because is would take place at an existing landfill. Landfill procedures for disease vector and erosion control require daily placement of cover on the working face and maintenance of a vegetative cover over uncontaminated soil on the remainder of the landfill site. Waste streams placed in the landfill typically have low levels of organic content, and standard dust control practices are routinely followed. Opportunities for bats to come into contact with the waste, either directly or indirectly, are minimal. Although no thresholds for exposure to radioactivity have been established for bats, a hypothetical scenario where bats could have routine unrestricted access to waste disposed at the 746-U Landfill, could be evaluated for potential radiological impact as follows.

DOE (DOE Order 5400.5 II.3.a(5), DOE 1990) and the National Council on Radiation Protection and Measurements (NCRP Report No. 109, 1991) have established a limit on the maximum acceptable dose rate to natural populations of aquatic biota at 1 rad/day (10 mGy/day). This dose limit was intended to apply to the most radiosensitive populations of aquatic organisms. Invertebrates are much more resistant to radiation induced damage than are vertebrates (e.g., fish). For example, a dose rate of 24 rad/day delivered during the life cycle of a snail did not significantly reduce reproduction (NCRP 1991).

No exposure limits for terrestrial biota have been formally established by DOE or by other regulatory agencies to date. However, DOE has issued an interim DOE Technical Standard, "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota" (ENVR-0011, July 2000). DOE guidance recommends the use of this interim technical standard for evaluating potential impacts to both aquatic and terrestrial biota in the Annual Site Environmental Reports (ASERs) for all DOE sites. The interim technical standard specifies the following dose limits:

- the absorbed dose to aquatic animals should not exceed 1 rad/day (10 mGy/day) from exposure to radiation or radioactive material;
- the absorbed dose to terrestrial plants should not exceed 1 rad/day (10 mGy/day) from exposure to radiation or radioactive material; and
- the absorbed dose to terrestrial animals should not exceed 0.1 rad/day (1 mGy/day) from exposure to radiation or radioactive materials.

The recommended limits for terrestrial biota are based on recommendations of the International Atomic Energy Agency (IAEA).

This recommended dose limit to terrestrial fauna of 0.1 rad/day may be compared with the dose limit established for the proposed action at the C-746-U landfill of 1 mrem/year to humans. The limit of 0.1 rad/day equates to 36,500 to 730,000 mrem/year, or more than 4 to 5 orders of magnitude greater than the 1 mrem/year dose limit established for the proposed action. Thus, attainment of the dose limit of 1 mrem/year for humans would also provide protection for terrestrial biota, with a substantial margin of safety.

The interim technical standard also tabulates values of the Biota Concentration Guide (BCG), which is defined as the limiting concentration of a radionuclide in soil, sediment or water, that would not cause dose limits for protection of populations of aquatic or terrestrial biota to be exceeded. These BCG values are much higher than concentrations of radionuclides in waste that would be considered for disposal at the C-746-U Landfill. For example, the BCG screening values for radioisotopes of uranium in soil are 2000 to 5000 pCi/g. These guidelines would indicate that terrestrial biota must be routinely exposed to concentrations greater than these levels before adverse impact would be expected.

These observations support the conclusions of the NCRP and IAEA for aquatic biota and the IAEA for terrestrial biota that the following statement by the International Commission on Radiological Protection (ICRP Publication 60, 1991) is reasonable: "...if man is adequately protected, then other living things are also likely to be sufficiently protected." It should also be noted that the metric used by these agencies to monitor protection of humans is the dose limit of 100 mrem/year rather than the constraint of 1 mrem/year selected for the proposed action at the C-746-U landfill, thereby adding an additional hundred-fold margin of safety for biota at this site.

The above analysis considers hypothetical bats that are directly exposed to waste streams potentially containing residual radioactivity, In relating this analysis to Indiana Bats that are potentially present near

the C-746-U Landfill, consideration of the potential exposure pathway is highly relevant. The bats are unlikely to come into direct contact with the waste streams. The most likely scenario for indirect exposure would be if an Indiana bat used one of the tributaries of Little Bayou Creek near the landfill as its riparian foraging zone. If the moths or other insects ingested by the bat had been in contact with the waste streams at the landfill through external contact with the waste or through ingestion of the waste, they could be carriers of residual radioactivity. Since moths and other insects are generally short-lived, there would be little opportunity for the radioactivity to bioaccumulate within individual insects through ingestion. Moreover, the waste streams disposed at the C-746-U Landfill are not generally attractive to insects because of their low organic content. Finally, normal operating practices minimize ways for insects to come into external contact with the waste.

CONCLUSION

The project as proposed would be unlikely to adversely affect the Indiana bat because:

- the Indiana bat is rare in the area;
- no habitat alteration or destruction would occur as a result of the proposed action;
- no bat habitat of any kind is present on the site of the proposed action;
- minimal foraging habitat (riparian vegetation along intermittent tributaries) is present near the site of the proposed action;
- routine landfill operating procedures would leave minimal opportunity for exposure of local biota, including any Indiana bats, to residual radioactivity; and
- if exposure did occur, it would be orders of magnitude below any available guidance related to dose limits for terrestrial fauna.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

September 18, 2001

Mr. James L. Elmore, Ph.D.
U.S. Department of Energy
Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831

Dear Dr. Elmore:

Thank you for your July 19, 2001, letter and enclosure (received on August 1, 2001) transmitting the Biological Assessment (BA) for the implementation of the authorized limits process for waste acceptance for the C-746-U Landfill at the Paducah Gaseous Diffusion Plant (PGDP), in McCracken County, Kentucky. The preferred Alternative 2 involves the acceptance of low levels of residual radioactive materials on a waste stream-specific and facility-specific basis at the C-746-U landfill. It should be noted that no new concentration-specific waste acceptance criteria (WAC) have been proposed for the C-746-U landfill. We are not aware that the existing WAC for the landfill address Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-derived waste disposal. The disposal of CERCLA-derived waste was not specifically mentioned in the BA or precluded by implementation of the preferred alternative. This BA included an evaluation of potential effects to the Federally endangered Indiana bat (*Myotis sodalis*). U.S. Fish and Wildlife Service (Service) personnel have reviewed the BA and offer the following comments for consideration.

The BA recognizes a 1991 collection record for the Indiana bat in McCracken County. The Kentucky Department of Fish and Wildlife Resources conducted mist-netting surveys on the West Kentucky Wildlife management Area (WKWMA) during the summers of 1999 and 2000. Those efforts resulted in the collection of five Indiana bats, including juvenile specimens, on the WKWMA. This information likely indicates the presence of a maternity colony somewhere near the PGDP. We have provided your office with a copy of the report detailing that investigation. The BA should be revised to reflect that information.

Since exposure pathways for humans and terrestrial biota differ significantly, we believe that the comparison of potential external absorbed radiation dose does not provide definitive information to support specific conclusions contained in the BA. While the BA suggests that specific radiological exposure limits for biota do not exist in current guidance or regulation, and would not be designated

as part of the proposed action, these facts should not preclude risk evaluations of sensitive receptors which may reside or forage near the project area. Any evaluation should consider a range of concentrations associated with waste stream-specific and facility-specific waste.

The BA suggests that since invertebrates are short-lived, the potential for bioaccumulation in an individual specimen is low. We believe that bioaccumulation over a short time period is quite possible. An evaluation which includes consideration of the potential for bioaccumulation of contaminants by terrestrial and aquatic invertebrates, as well as the foraging behavior of the Indiana bat would provide supporting documentation to this BA.

Service personnel are participating on the PGDP Ecological Risk Assessment Working Group (ERAWG) and recent discussions by this group and others have been held to define the scope of work necessary to characterize potential risks associated with the C-746-U landfill. We believe it is prudent that WAC are identified and that performance and risk evaluations for the C-746-U landfill completed prior to our concurrence with your "not likely to adversely affect" finding. Therefore, informal consultation pursuant to Section 7 of the Endangered Species Act should be continued until all uncertainties associated with this action are thoroughly evaluated.

These constitute the comments of the U.S. Department of the Interior in accordance with provisions of the Endangered Species Act (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.). We appreciate the opportunity to comment. Should you have any questions or need further assistance, please contact Steve Alexander of my staff at 931/528-6481, ext. 210, or via e-mail at *steven_alexander@fws.gov*.

Sincerely,

for Lee A. Barclay, Ph.D.
Field Supervisor

xc: Joe Johnston, FWS, Atlanta
Laila Lienesch, FWS, Frankfort
Don Seaborg, DOE, Paducah
Wayne Davis, KDFWR, Frankfort
Jeff Crane, EPA, Atlanta
Tuss Taylor, KDWM, Frankfort

Department of Energy

Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831—

November 7, 2001

Dr. Lee A. Barclay, Ph.D.
Field Supervisor
Fish and Wildlife Service
446 Neal Street
Cookville, Tennessee 38501

Dear Dr. Barclay:

ADDITIONAL INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT FOR THE PROPOSED IMPLEMENTATION OF AUTHORIZED LIMITS PROCESS AT THE C-746-U LANDFILL IN PADUCAH, KENTUCKY

Thank you for meeting with us on October 15, 2001 to discuss comments of September 18, 2001 from your office on a Biological Assessment (BA) regarding the proposed implementation of the authorized limits process for waste acceptance at the C-746-U Landfill, Paducah Gaseous Diffusion Plant (PGDP), Paducah, Kentucky. This BA considered the federally listed species *Myotis sodalis* and was prepared as requested in your letter of June 13, 2001 and submitted to you on July 19, 2001.

The Department of Energy (DOE) has revised the BA in accordance with the comments and subsequent discussions and is submitting the Final BA for your review and concurrence. Based on the Final BA, DOE has determined that the proposed implementation of the authorized limits process at the C-746-U Landfill at the Paducah Gaseous Diffusion Plant (PGDP) is not likely to adversely affect the listed species, *Myotis sodalis*. Results of the BA will be summarized in the text of the Environmental Assessment (EA) for the project, and the Final BA will be appended to the Final EA when it is published.

Following your review of the Final BA, please check the appropriate concurrence block and sign below. Please fax your comments to me at (865) 576-0746 as soon as possible, so that we may expeditiously complete the Final EA. If you need further information or wish to discuss the Final BA, please call me at (865) 576-0938. Thank you in advance for your prompt reply.

Sincerely,

James L. Elmore

James L. Elmore, Ph.D.
Alternate NEPA Compliance Officer

Enclosure

cc: David Tidwell, EM-34
Harvey Rice, EM-34

Letter to Dr. Lee A. Barclay, Ph.D.
Dated November 6, 2001
Subject: **ADDITIONAL INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT FOR THE PROPOSED IMPLEMENTATION OF AUTHORIZED LIMITS PROCESS AT THE C-746-U LANDFILL IN PADUCAH, KENTUCKY**

☐ This Biological Assessment supports the conclusion that the implementation of the authorized limits process at the C-746-U Landfill, Paducah Gaseous Diffusion Plant, would not adversely impact federally listed protected species and/or habitat. With this BA, DOE has satisfied consultation requirements of Section 7 of the Endangered Species Act.

☐ This Biological Assessment does not support the conclusion that the implementation of the authorized limits process at the C-746-U Landfill, Paducah Gaseous Diffusion Plant, would not adversely impact federally listed protected species and/or habitat. DOE has not satisfied consultation requirements of Section 7 of the Endangered Species Act.

_____

Signature Date

Endangered Species Act

BIOLOGICAL ASSESSMENT

Paducah C-746-U Landfill

Implementation of the Authorized Limits Process

Paducah Gaseous Diffusion Plant

McCracken County, Kentucky

Prepared by

Anne Dickie, M.S.

Senior Scientist, Tetra Tech, Inc.

October 2001

U. S. Department of Energy

Oak Ridge Operations Office

Oak Ridge, TN

BIOLOGICAL ASSESSMENT FOR THREATENED AND ENDANGERED SPECIES *UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT* FOR AN EXISTING SOLID WASTE LANDFILL

SUMMARY

This biological assessment (BA) evaluates potential impacts on federally listed species that could result from the implementation of the authorized limits process at the C-746-U Landfill at the Paducah Gaseous Diffusion Plant (PGDP) in McCracken County, Kentucky. The species considered in this BA is the endangered Indiana bat as identified in a letter from the U.S. Fish and Wildlife Service to the U.S. Department of Energy, dated June 13, 2001 (FWS 2001a).

DOE concludes, for the reasons described in the main text of this BA, that the project is not likely to adversely affect this species. Also, since no proposed or designated critical habitats are present on, or near, the locations where activities would occur, none would be affected.

INTRODUCTION AND PROJECT DESCRIPTION

The C-746-U Landfill is an existing, sanitary/industrial landfill that was constructed from 1995 to 1997 by DOE for disposal of solid wastes that are not regulated as hazardous waste under *Resource Conservation and Recovery Act* (RCRA) Subtitle C or as waste containing polychlorinated biphyenyls (PCBs) under the *Toxic Substances Control Act* (TSCA). The C-746-U Landfill is located north of DOE Paducah's main plant area and is permitted by the Commonwealth of Kentucky in accordance with the requirements of Kentucky solid waste regulations [401 Kentucky Administrative Regulations (KAR) 48, *Standards for Solid Waste Facilities*] and Subtitle D of RCRA. The landfill is lined, has a leachate collection system, and will have a multi-layer cap when closed.

Waste streams that may be acceptable for disposal at the C-746-U Landfill are generated from activities at the Paducah Site and include soils, wood, concrete, roofing and construction debris, and other

nonhazardous sanitary and industrial wastes [e.g., paper, fly ash, treated medical waste, asbestos, cardboard, tires, animal carcasses, detectable PCB (less than 50 ppm) waste, personal protective equipment, plastic, alkaline batteries, and metals]. The proposed action would not affect designation of the landfill as a sanitary/industrial landfill that does not accept RCRA-hazardous, TSCA-regulated, or radioactive waste.

Operation of the C-746-U facility is regulated by DOE under the authority of the *Atomic Energy Act* (AEA) and the Commonwealth of Kentucky under authority delegated by the U.S. Environmental Protection Agency (EPA) to enforce implementing regulations for RCRA through provisions in regulations for solid waste landfills by the Commonwealth of Kentucky (401 KAR 48). Under the AEA, DOE has the responsibility and authority to establish radiological limits for protection of the public and the environment, either in the form of release criteria for off-site disposition of waste it generates or for waste acceptance criteria for disposal of materials in a DOE-owned onsite landfill.

The following brief description is extracted from the draft Environmental Assessment (EA) for the project (DOE 2001). Of the two alternatives considered in the EA, one is No Action, and the second is implementation of the authorized limits process at the existing landfill. Alternative 1 - No Action would not affect wildlife, including listed species; thus, it is not considered further. The remaining alternative is briefly described below.

Alternative 2, the preferred alternative, in the EA (DOE 2001) is to implement the authorized limits process for determining the acceptability of solid waste containing low levels of residual radioactive materials on both a surface-contaminated and a volumetric basis in accordance with established DOE requirements for disposal at the C-746-U Landfill. Authorized limits are described in DOE Order 5400.5 Chapter IV, *Residual Radioactive Materials*, and are limits approved by DOE to permit the release of property from DOE radiological control, consistent with radiation protection standards for general employees, members of the public, and the environment. Authorized limits determinations would be evaluated in accordance with DOE Order 5400.5 and its associated guidance and would be both waste stream-specific and facility-specific.

Under Alternative 2, DOE would implement the authorized limits process per DOE Order 5400.5 to determine the acceptability of waste streams containing small amounts of residual radioactive materials in mass or volume for disposal at the C-746-U Landfill on a waste stream-specific basis. These authorized limits would differ from the operating limits or waste acceptance criteria historically used at this landfill for the acceptance of materials containing residual radioactivity as these limits would be developed on a waste stream-specific basis and formally approved in accordance with the requirements of DOE Order 5400.5 (or successor documents) and associated guidance. Waste streams containing residual amounts of surface radioactivity would be accepted for disposal if below the generic authorized limits enumerated in DOE Order 5400.5 (Table IV-1); however, any other authorized limits for surface radioactivity would have to be formally evaluated and approved by DOE on a waste stream-specific basis in accordance with DOE Order 5400.5 requirements. The WAC for the landfill would be revised to specify that the authorized limits process must be used where appropriate to determine and document the acceptability of waste for disposal. As before, RCRA-hazardous, TSCA-regulated, and radioactive waste would not be accepted.

DOE Order 5400.5 and its associated guidance allow for local approval of authorized limits which would result in an effective dose equivalent (EDE) to humans of 1 mrem/year or less. Authorized limits resulting in an annual EDE between 1 mrem and 25 mrem require additional approval by DOE Headquarters. The cognizant DOE field office has chosen to use a 1 mrem/year dose level in developing authorized limits for any wastes to be disposed at the C-746-U Landfill. Approval of authorized limits for waste streams to be disposed of at the C-746-U Landfill would be based on a dose assessment to demonstrate that the levels of residual radioactive materials in a given waste stream would satisfy criteria specified in DOE Order 5400.5 and associated guidance as well as to satisfy the DOE-ORO dose level of 1 mrem/yr EDE to the public for the C-746-U Landfill.

The dose assessment would evaluate the potential dose to both workers and the public under current and potential future scenarios. Each analysis would be modeled for specific waste streams at the landfill using conservative assumptions to estimate the potential doses. Only those waste streams estimated to result in doses of 1 mrem/yr EDE or less would be eligible for disposal at the landfill. Waste streams

containing residual radioactive materials below approved authorized limits do not require radiological control under the AEA and are not considered radioactive waste.

Specific exposure limits for biota would not be designated as part of the proposed action because no such limits have been formally established by DOE or by other regulatory agencies, and potential pathways for exposure as a result of this action are very limited. The proposed action would not entail alteration or loss of habitat because it would take place at an existing landfill. Landfill procedures for vector and erosion control require daily placement of cover on the working face and maintenance of a vegetative cover over clean cover over the remainder of the landfill site. Waste streams placed in the landfill have low levels of organic content, and standard dust control practices are routinely followed. Thus, opportunities for local biota to come into contact with the waste, either directly or indirectly, are minimal. This is discussed in greater detail in the impacts section of this BA.

STATUS AND BIOLOGY OF THE LISTED SPECIES

Informal consultations were conducted in May 2001 with the USFWS, KDFWR, and the Kentucky State Nature Preserves Commission (KSNPC) to ascertain the potential presence of any listed species near the landfill. The U. S. Fish & Wildlife Service identified the Indiana bat (*Myotis sodalis*) as a federally-endangered species that could potentially occur near the landfill site (FWS 2001a). The Indiana bat is also a listed species by the Commonwealth of Kentucky. The Kentucky State Nature Preserves Commission reported an occurrence of the Indiana bat in McCracken County (KSNPC 2000), but not at the PGDP site (DOE 2000a). This reported occurrence in McCracken County, a result of mist netting, was made in June 1991 and was on West Kentucky Wildlife Management Area (WKWMA) land in the Joppa Quadrangle near the Shawnee Steam Plant and to the north of the landfill site (Hines 2001). More recently, five individuals of the Indiana bat were captured at two mist netting sites in riparian hardwood habitat near the lower downstream reaches of Bayou Creek in the WKWMA during surveys in 1999 (KDFWS, 2000). These locations were also to the north and approximately 2 mi (3.3 km) from the C-746-U Landfill. As a result of these sightings, the DOE has prepared this biological assessment considering potential impacts of the proposed action to the Indiana bat based on the presumption that the bat could be present near the landfill. The general ecology of the Indiana bat is summarized below.

Unless otherwise noted or referenced, general biological information on the species is derived from Harvey (1992 and 1999) and Webb (2000).

Indiana bat (*Myotis sodalis*)

The range of the endangered Indiana bat is the eastern U.S. from Oklahoma, Iowa, and Wisconsin east to Vermont and south to northwestern Florida. Distribution is associated with major cave regions and areas north of cave regions. The present total population is estimated at ca. 352,000 with more than 85% hibernating at only nine locations - two caves and a mine in Missouri, three caves in Indiana, and three caves in Kentucky.

Indiana bats hibernate in limestone caves from October to April, depending upon climatic conditions. Indiana bats usually hibernate in large, dense clusters of up to several thousand individuals in sections of the hibernation cave where temperatures average 38 - 43 F and with relative humidities of 66 to 95 percent. Bat clusters may contain 300 - 384 bats per square foot. The bats leave the caves and migrate to summer roosts in mid-spring.

Summer roosting-habitat criteria for Indiana bats are frequently revised as more is discovered about this species' habits. The most recent information applicable for the region is available from the FWS Cookeville Office (FWS 2001b). In general, Indiana bats establish summer maternity and sometimes male night roosts or bachelor colonies under the loose bark of large, usually hardwood trees [typically > 12.2 in (31 cm) diameter at breast height (dbh)]. Indiana bats have been observed to return to the same roosting and foraging habitat year-after-year. Indiana bats forage at night and feed on insects.

Female Indiana bats depart the caves before the males and arrive at summer maternity roosts in mid-May. A single off-spring, born in June, is raised by the mother under loose tree bark, primarily in wooded streamside habitat. Mothers and babies reside in maternity colonies that use multiple, primary roost trees throughout most of the summer. Secondary roosts are used intermittently by some of the bats, particularly during periods of extreme precipitation or extreme temperatures. Thus, there may be more than a dozen roosts used by some Indiana bat colonies (FWS 1999). Kurta et al. (1996) found that

female Indiana bats may change roosts about every three days, and a group of these bats may use more than 17 different trees in a single maternity season. They depart the summer roosts for hibernation caves in September. The summer roost of the adult males is often near the maternity roost, although a few males do stay in caves over the summer.

The first maternity colony was discovered in 1974 under the loose bark on a dead butternut hickory tree in east-central Indiana. The colony numbered about 50 individuals and also used an alternate roost under the bark of a living shagbark hickory tree. The total foraging range of the colony consisted of a linear strip along approximately 0.5 mi. of creek. Foraging habitat was confined to air space from 6 ft to ca. 95 ft high near the foliage of streamside and floodplain trees. Two additional colonies were discovered during subsequent summers, also in east-central Indiana. These had estimated populations of 100 and 91 respectively, including females and pups. Habitat and foraging area were similar to the first colony discovered. Evidence gathered during recent years indicates that, during summer, Indiana bats are widely dispersed in suitable habitat throughout a large portion of their range. Additional maternity colonies have been discovered using radiotelemetry techniques in more recent years. Data thus far reinforce the belief that floodplain forest is important habitat for Indiana bat summer populations. However, colonies have been located in upland and in coniferous habitats as well.

The bats arrive near their hibernation caves between August and September and begin swarming and mating activities. Swarming at the cave entrances continues into mid- or late October. The bats continue feeding during this time building a store of fat reserves for hibernation. It is thought that Indiana bats feed primarily on moths. Open riparian corridors along streams are required for foraging habitat. A longevity record of 13 years and 10 months has been recorded for the Indiana bat. Hibernating bats leave little evidence of their past numbers; thus, it is difficult to calculate a realistic estimate of the population decline for this species. However, population estimates at major hibernacula indicated a 34% decline in the total Indiana bat population from 1983 to 1989.

Although the C-746-U Landfill site has no hibernating or roosting habitat as described above, the creeks within an expanded area around the landfill site do provide Indiana bat summer foraging habitat. No maternity roosts have been verified on the WKWMA, but five individuals, including three juveniles,

were captured in the WKWMA during mist netting surveys in 1999 (KDFWS 2000) and a single specimen was reported in 1991 (KSNPC 2000).

ECOLOGICAL DESCRIPTION OF THE SITES

The following brief description taken from the draft EA for the project (DOE 2001) was verified through field reconnaissance by the author (A. Dickie, Tetra Tech, Inc., August, 2000). The C-746-U Landfill occurs within existing industrialized areas, but outside the fenced area, of the Paducah Gaseous Diffusion Plant. The WKWMA is to the landfill site's western side. The landfill site has been cleared and, where vegetative cover is present, is maintained by mowing. Vegetation on the landfill site consists of shallow-rooted grasses and other herbaceous ground cover and could provide a small amount of minimally suitable foraging habitat, but no roosting habitat for the Indiana bat.

Two intermittent tributaries of Little Bayou Creek, an intermittent stream, flow approximately 100 ft and 50 ft from the eastern and northwestern boundaries of the landfill site respectively. These tributaries are partially bordered by a thin riparian zone of plants. Trees, when present in close proximity to the landfill site, mainly along the two tributaries, are generally less than 12.2 in (30 cm) dbh and do not have loose bark as required by roosting Indiana bats. This riparian area near the landfill site could provide a small amount of potential foraging habitat but, no roosting habitat for the Indiana bat.

The nearby WKWMA consists primarily of stands of bottomland hardwoods interspersed with upland hardwoods and old fields. Potential summer roosting and foraging habitats for the Indiana bat are present in the WKWMA, although most trees are less than 12.2 in (30 cm) dbh. The Bayou Creek (formerly known as Big Bayou Creek) is the nearest blue-line stream in the area; the nearest of its tributaries to the landfill are on the western side of the WKWMA.

POTENTIAL IMPACTS OF THE PROJECT

The proposed action would not entail alteration or loss of habitat because is would take place at an existing landfill. Landfill procedures for disease vector and erosion control require daily placement of

cover on the working face and maintenance of a vegetative cover over uncontaminated soil on the remainder of the landfill site. Historically, waste streams placed in the landfill have had low levels of organic content, and standard dust control practices are routinely followed. Opportunities for bats to come into contact with the waste, either directly or indirectly, are minimal. Although no thresholds for exposure to radioactivity have been established for bats, a hypothetical scenario where bats could have routine unrestricted access to waste disposed at the C-746-U Landfill, is qualitatively evaluated for potential radiological impact as follows.

DOE (DOE Order 5400.5 II.3.a(5), DOE 1990) and the National Council on Radiation Protection and Measurements (NCRP 1991) have established a limit on the maximum acceptable dose rate to natural populations of aquatic biota at 1 rad/day. This dose limit was intended to apply to the most radiosensitive populations of aquatic organisms. Invertebrates are much more resistant to radiation induced damage than are vertebrates (e.g., fish). For example, a dose rate of 24 rad/day delivered during the life cycle of a snail did not significantly reduce reproduction (NCRP 1991).

No exposure limits for terrestrial biota have been formally established by DOE or by other regulatory agencies to date. However, DOE has issued an interim DOE Technical Standard, "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota" (ENVR-0011) (DOE 2000b). DOE guidance recommends the use of this interim technical standard for evaluating potential impacts to both aquatic and terrestrial biota in the Annual Site Environmental Reports (ASERs) for all DOE sites. The interim technical standard specifies the following dose limits:

- the absorbed dose to aquatic animals should not exceed 1 rad/day from exposure to radiation or radioactive material;

- the absorbed dose to terrestrial plants should not exceed 1 rad/day from exposure to radiation or radioactive material; and

- the absorbed dose to terrestrial animals should not exceed 0.1 rad/day from exposure to radiation or radioactive materials.

These recommended limits for terrestrial biota are based on recommendations of the International Atomic Energy Agency (IAEA).

The generic dose limits listed above were developed using conservative assumptions, but were not specifically developed for individual species or organisms. The radiological dose absorbed by individual species or organisms in the same environment could vary depending upon the physiology, habitat, and resource utilization of the species or individual. Additionally, organisms may differ in their sensitivity to similar doses of absorbed radiation depending upon species, age, gender, or size. Since the absorbed doses experienced by different species or organisms could vary at any given location, the application of these generic dose limits to individual organisms must be approached with caution.

Some complexities of developing and applying generic dose limits to individual species may be illustrated by recent studies to validate models for dose estimation and on ecological risk assessment (Congdon 2001, Hinton 1993a, 1993b, 1998, and 1999). This is especially true when studying animals in their natural environment where multiple factors may cause and compound adverse effects to the animal. Identification of species-specific thresholds for observable effects as well as actual mortality thresholds that are attributable to exposures to radionuclides can be complicated by the potential presence of other contaminants in the environment. For example, many scientists believe that the declines in Indiana bat populations may be caused both directly and indirectly by pesticide use. Pesticides can affect bat populations by decreasing the quantity of insects available, by contaminating their food and water, or through direct exposure to chemicals when feeding in areas that have been recently treated (FWS 1998).

The seasonal nature of the Indiana bat's foraging habits and metabolism illustrates another type of consideration that would be involved in developing species-specific dose limits. The Indiana bat is insectivorous and will ingest as much as possible while active in the spring and summer in order to build up fat reserves for the winter (FWS 1999). Thus, although bats may have relatively low metabolic rates (Neuhasuer 1969 and YDRR 2001), they could potentially accrue relatively high radiological doses from the ingestion of contaminated insects over the foraging season. However, there are no empirical data to support the development of a radiological dose limit specifically for bats.

In the absence of specific data or dose limits for an individual species or type of animal (e.g., the Indiana bat), dose limits may be discussed on a screening basis. The recommended dose limit for terrestrial fauna is 0.1 rad/day, and the dose limit established for the proposed action at the C-746-U landfill is 1 mrem/year to humans. Using the generic dose limits provided above, the limit of 0.1 rad/day for terrestrial biota would equate to 36,500 to 730,000 mrem/year, a limit more than 4 to 5 orders of magnitude greater than the 1 mrem/year dose limit established for the proposed action. From this screening perspective, an individual species would have to absorb radiation on a mass equivalent (energy absorbed per gram of tissue) basis at a rate of 1×10^4 or 1×10^5 greater than humans to receive unacceptable doses of radiation from residual radiation in waste streams that might be accepted at the C-746-U Landfill under the proposed action. Thus, a dose limit of 1 mrem/year for humans should also provide protection for terrestrial biota in general.

The interim technical standard also tabulates values of the Biota Concentration Guide (BCG), which is defined as the limiting concentration of a radionuclide in soil, sediment or water that would not cause dose limits for protection of populations of aquatic or terrestrial biota to be exceeded. These BCG values are much higher than concentrations of radionuclides in waste that would be considered for disposal at the C-746-U Landfill. For example, the BCG screening values for radioisotopes of uranium in soil are 2000 to 5000 pCi/g. These guidelines would indicate that terrestrial biota must be routinely exposed to concentrations greater than these levels before adverse impacts would be expected.

These observations support the conclusions of the NCRP and IAEA for aquatic biota and the IAEA for terrestrial biota that the following statement by the International Commission on Radiological Protection (ICRP 1991) is reasonable: "...if man is adequately protected, then other living things are also likely to be sufficiently protected." It should also be noted that the metric used by these agencies to monitor protection of humans is the dose limit of 100 mrem/year rather than the constraint of 1 mrem/year selected for the proposed action at the C-746-U landfill, thereby adding an additional hundred-fold margin of safety for biota at this site.

The above discussion considers hypothetical bats that are directly exposed to waste streams potentially containing residual radioactivity. As noted above, direct correlations between radiological doses

absorbed by human and radiological doses absorbed by bats must be approached with caution. In relating this analysis to Indiana bats that are potentially present near the C-746-U Landfill, consideration of the potential exposure pathway and likelihood of exposure for the bats is highly relevant. The waste would be exposed only during daytime operating hours when the bats are generally not active and are under cover. Regulations for solid waste landfills require that waste be covered at least daily, and that dust generation be minimized as a part of normal operating procedures. Thus, the bats are unlikely to come into direct contact with the waste streams.

Although unlikely, it is possible that an Indiana bat foraging over the riparian area along the tributaries of Little Bayou Creek near the landfill (or over the grass cover at the landfill site) might ingest insects containing residual radioactivity from C-746-U Landfill waste. For example, if the moths or other insects ingested by the bat had been in contact with waste streams at the landfill through external contact with the waste or through ingestion of the waste, they could be carriers of residual radioactivity. Normal operating practices minimize ways for either the insects or the bats to come into external contact with the waste. Routine dust control measures and daily cover practices at the landfill minimize the potential for radiological contamination of nearby surfaces, including vegetation, on an ongoing basis. A multi-layer cover system topped by a surface layer of shallow-rooted vegetation for the purposes of erosion control is placed over segments of the landfill as waste disposal is completed. This vegetation would not be expected to penetrate below the clean soil cover layer of the landfill and would not accumulate residual radioactivity via uptake through the root system. The cover system is also designed to discourage any burrowing animals. Thus, it is unlikely that insects, or other organisms, would ingest or come into contact with waste disposed of at the C-746-U Landfill. As a result, it is unlikely that residual radioactivity from the waste would enter the food chain of the Indiana bat.

CONCLUSION

It is not necessary to conduct a quantitative estimate and assess a radiological absorbed dose for bats as a result of the proposed action, and the project as proposed would be unlikely to adversely affect the Indiana bat because:

- while a potential for exposure of the bats to the waste as a result of the proposed action cannot be ruled out, there is nothing to indicate that such exposure would be more likely than the potential for exposures of humans working at the landfill;

  - minimal foraging habitat for the bats is present on the site for the proposed action;

  - foraging habitat (riparian vegetation along intermittent tributaries) present near the site of the proposed action is unlikely to become contaminated by residual radioactivity from waste disposed of at the C-746-U Landfill;

  - routine landfill operating procedures would allow minimal opportunity for direct exposure of local biota, including Indiana bats, to residual radioactivity;

  - routine landfill operating procedures would allow minimal opportunity for residual radioactivity from the waste to enter the food chain of local biota, or otherwise lead to indirect exposure of Indiana bats to radioactivity;

- a margin of safety of at least 1×10^4 for the bats inherent to the dose limits set for humans under the proposed action is assumed;

  - if exposure did occur, it would be orders of magnitude below any available guidance related to dose limits for terrestrial fauna; and

- no habitat alteration or destruction would occur as a result of the proposed action.

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United States Department of the Interior

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December 4, 2001

Mr. James L. Elmore, Ph.D.
U.S. Department of Energy
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Oak Ridge, Tennessee 37831

Dear Dr. Elmore:

Thank you for your letter and enclosure of November 7, 2001, transmitting the revised Biological Assessment (BA) for the implementation of the authorized limits process at the C-746-U Landfill at the Paducah Gaseous Diffusion Plant in McCracken County, Kentucky. This revised BA includes an evaluation of potential effects to the Federally endangered Indiana bat (*Myotis sodalis*). U.S. Fish and Wildlife Service (Service) personnel have reviewed the revised BA and offer the following comments for consideration.

The BA is adequate and supports the conclusion of not likely to adversely affect, with which we concur. In view of this, we believe that the requirements of Section 7 of the Endangered Species Act (Act) have been fulfilled and that no further consultation is needed at this time. However, obligations under Section 7 of the Act must be reconsidered if: (1) new information reveals that the proposed action may affect listed species in a manner or to an extent not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered in this biological assessment, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

These constitute the comments of the U.S. Department of the Interior in accordance with provisions of the Endangered Species Act (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.). We appreciate the opportunity to comment. Should you have any questions or need further assistance, please contact Steve Alexander of my staff at 931/528-6481, ext. 210, or via e-mail at *steven_alexander@fws.gov*.

Sincerely,

Lee A. Barclay, Ph.D.
Field Supervisor

xc: Joe Johnston, FWS, Atlanta
Wayne Davis, KDFWR, Frankfort